IN THE CLAIMS

1. (Original) A method for forming an optical fiber sensor comprising the steps of:

coating a first end of a first optical fiber with a film, the film having a refractive index different from the first optical fiber; and

splicing a second fiber to the first fiber, the second fiber having a refractive index different from the film, whereby a first interface between the first fiber and the film causes a first reflection and a second interface between the film and the second fiber causes a second reflection when light is launched into the first fiber, whereby light from the first and second reflections propagates backward along the first fiber and light from the first reflection interferes with light from the second reflection other such that changes in a thickness of the thin film result in observable changes in an amplitude of the light from the first and second reflections.

2. (Original) The method of Claim 1, wherein the film is deposited using a sputtering technique.

3. (Original) The method of Claim 1, wherein the film is deposited using a vapor deposition technique.

4. (Original) The method of Claim 3, wherein the vapor deposition technique is a chemical vapor deposition technique.

5. (Original) The method of Claim 1, further comprising the step of depositing a film on an end of the second fiber to which the first end of the first fiber is spliced.

6. (Original) The method of Claim 1, wherein the second fiber is spliced to the first fiber using a thermal fusion technique.

7. (Original) The method of Claim 1, wherein the film has a thickness between approximately 1 nanometer and approximately 100 microns.

8. (Original) The method of Claim 1, wherein the film comprises magnesium oxide.

9. (Original) The method of Claim 1, wherein the film comprises titanium dioxide.

10. (Original) A method for forming an optical fiber sensor comprising the steps of:

arranging a first fiber with a first end and a second fiber with a second end such that the first end and the second end are separated by an air gap; and

exposing the first end and the second end to a vapor of a dielectric material such that dielectric material is deposited in the gap, the dielectric material having a refractive index different from the first and second fibers; and

splicing the first end to the second end, whereby a first interface between the first end and the dielectric material causes a first reflection and a second interface between the dielectric material and the second end causes a second reflection when light is launched into the first fiber, whereby light from the first and second reflections propagates backward along the first fiber, and light from the first reflection interferes with light from the second reflection such that changes in a thickness of the dielectric material result in observable changes in an amplitude of the light from the first and second reflections.

11. (Original) The method of Claim 10, wherein the first end and the second end are bare at a start of the exposing step.

12. (Original) The method of Claim 10, wherein the first end and the second end are polished at a start of the exposing step.

13. (Original) The method of Claim 10, wherein the dielectric material is deposited using a sputtering technique.

14. (Original) The method of Claim 10, wherein the dielectric material is deposited using a chemical vapor deposition technique.

15. (Original) The method of Claim 10, wherein the second end is spliced to the first end using a thermal fusion technique.

16. (Original) The method of Claim 10, wherein the dielectric material has a thickness between approximately 1 nanometer and approximately 100 microns.

17. (Original) The method of Claim 10, wherein the dielectric material comprises magnesium oxide.

18. (Original) The method of Claim 10, wherein the dielectric material comprises titanium dioxide.

19. (Original) A method for forming an optical fiber sensor comprising the steps of:

providing an optical fiber, the optical fiber having a core surrounded by a cladding;

removing a portion of the cladding to form a void, the void having a first surface and a second surface, the first and second surfaces being parallel, whereby light propagating in the optical fiber is reflected at each of the two surfaces and propagates backward along the optical fiber, whereby light reflected from the first surface interferes with light reflected from the second surface such that changes in a distance between the first and second surfaces result in observable changes in an amplitude of such reflected light.

20. (Original) The method of Claim 19, wherein the first and second surfaces are perpendicular to the core.

21. (Original) The method of Claim 19, wherein the portion of the cladding is removed using wet chemical etching.

22. (Original) The method of Claim 19, wherein the portion of the cladding is removed using reactive ion dry eteching.

23. (Original) The method of Claim 19, wherein the void is circumferentially uniform.

24. (Original) The method of Claim 19, wherein the void is circumferentially non-uniform.

25. (Original) A method for forming an optical fiber sensor comprising the steps of:

forming a mask over an optical fiber, the optical fiber having a core surrounded by a cladding, the mask having a single opening;

exposing the opening to radiation such that a refractive index of a portion of the fiber corresponding to the opening is changed, whereby light propagating in the optical fiber is reflected at a first end and at a second end of the portion and propagates backward along the optical fiber, light reflected at the first end of the portion interfering with light reflected from the second end of the portion such that changes in a width of the portion result in observable changes in an amplitude of such reflected light.

26. (Original) The method of Claim 25, wherein the exposing step results in a change in a refractive index of the core.

27. (Original) The method of Claim 25, wherein the exposing step results in a change in a refractive index of the cladding.

28. (Original) The method of Claim 25, wherein the exposing step results in a change in a refractive index of the core and the cladding.

29. (Original) The method of Claim 25, wherein the exposing step is performed using a laser beam.

30. (Original) The method of Claim 25, wherein the fiber is doped with germanium.

31. (Original) The method of Claim 25, wherein exposing step is performed using an energized ion beam.

32. (Original) A method for utilizing a plurality of sensors comprising the steps of:

launching an optical pulse into an optical fiber, the optical fiber having a plurality of optical sensors formed therein, the optical sensors being spaced apart; and

measuring amplitudes of a backward-propagating reflection peaks in the fiber at a plurality of times, each of the times corresponding to a location of one of the plurality of optical sensors.

33. (Original) The method of Claim 32, further comprising the steps of:

measuring an amplitude of background noise in the fiber at a time close to each of the reflection peaks; and

calculating a ratio of each reflection peak amplitude to a corresponding amplitude of background noise.

34. (Original) The method of Claim 32, wherein the plurality of optical sensors are formed using the method of Claim 1.

35. (Original) The method of Claim 32, wherein the plurality of optical sensors are formed using the method of Claim 10.

36. (Original) The method of Claim 32, wherein the plurality of optical sensors are formed using the method of Claim 25.

37. (Original) The method of Claim 32, wherein the plurality of optical sensors are fiber Bragg grating sensors.

38. (Original) The method of Claim 32, wherein the plurality of optical sensors are Fabry-Perot sensors.

39. (Original) The method of Claim 38, wherein the optical sensors are designed such that a cavity length varies only over a quasi-linear range of a half fringe under conditions to which the optical sensors are exposed.

40. (New) A method for forming and multiplexing a plurality of optical fiber sensors on an optical fiber comprising the steps of:

forming a plurality of masks over an optical fiber, the optical fiber having a core surrounded by a cladding, each of the masks having a single opening, the openings of the plurality of masks being spaced apart;

exposing each of the openings to radiation such that a refractive index of a corresponding portion of the optical fiber is changed, whereby light propagating in the optical fiber is reflected at a first end and at a second end of each of the portions and propagates backward along the optical fiber, light reflected at the first end of each portion interfering with light reflected from the second end of each portion such that changes in a width of the portion result in observable changes in an amplitude of such reflected light;

launching an optical pulse into the optical fiber;

measuring amplitudes of backward-propagating reflection peaks in the fiber at a plurality of times, each of the times corresponding to a location of one of the portions of the optical fiber whose refractive index was changed during the exposing step.